Reg. No: 2015/18/E/NZ6/00602; Principal Investigator: dr Ewa Agnieszka Pocheć

The immune system, called the guardian of the body, protects us against diseases caused by microorganisms. In some cases immune cells attack and destroy their own antigens, leading to the development of autoimmune diseases. **Autoimmune thyroid diseases**, including Hashimoto's thyroiditis and Graves disease, are one of the most common autoimmune disorders.

Thyroid gland produces thyroxine and triiodothyronine, hormones that regulate essential processes in our body. Hashimoto's thyroiditis is characterized by hypothyroidism; thyroid produces hormones on a very low level due to the destruction of gland by self-aggressive immune cells. Thyroid of patients with Graves disease overproduces hormones, because of the constant activation of thyroid-stimulating hormone receptor by antibody. Endocrine disorders of the thyroid cause the wide spectrum of clinical manifestations, including disturbances of heart rhythm, gastrointestinal and reproductive systems.

Although the autoimmune thyroid diseases were discovered many years ago, we still do not know the exact reasons and all the mechanisms influencing the development of these diseases. Many researchers search for genes and proteins which expression is changed in thyroid and immune cells. While **our group focuses on glycans** - the third type of cell macromolecules. Glycans linked to proteins (named glycoproteins) present on cell surface are particularly important in cellular interactions.

Thyroid proteins, recognized by self-reactive antibodies, are glycoproteins. The recent studies have showed that glycosylation of these proteins is changed in the course of both autoimmune diseases. It was also proved that the glycosylation of antibodies against thyroid is altered. While the aim of our study planned in this proposal is to search for glycosylation changes on T helper cells which participate in thyroid inflammation, apart from the antibodies. If we find the differences in T cell glycosylation, it will be also interesting to determine the cytokines which are responsible for changed glycosylation profile of immune cells. To solve this problem, **we created an interdisciplinary research team** composed of experts in the field of glycobiology, immunology and clinic endocrinology from Jagiellonian University and University of Warsaw. The members of the team are also two PhD students well-educated in glycoimmunoendocrinology and methods of molecular biology. All the studies will be performed on human T cells using **modern molecular biology techniques**, namely flow cytometry, ELISA tests, high-performance liquid chromatography (HPLC) and real time PCR.

What do we expect to add to thyroid autoimmunity knowledge? Changes of the structure and the number of glycans result often in aberrant function of glycoproteins and consequently affect the behavior of whole cells. Determining of the glycosylation changes in autoimmune thyroid diseases and the cytokines that regulate these alterations gives the opportunity to answer the next questions, among them how eliminate them to restore the correct behavior of T cells. It is known that **glycosylation changes are an important part of autoimmunity**. Our studies are designed to fill in the missing gaps in this area of science.

Finding the reasons for triggering the mechanisms of autoimmunity in human body is crucial for opening the ways to looking for methods of prevention and treatment of autoimmune diseases.